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one, 12 feet; of the newly found one, less than 6. Leaves of one like those of peach, of the other more like apple. The fruit in one, 4 to 6 inches in length; in the other, from 1½ to 3. In spring the blossoms were 32+4 buds on the first, 28+4 buds on the other; color of fruit, one red—fruit sparsely set; of the other, clear amber—fruit closely set; shape of one, spherical; of the other, flattened, like the earth at the poles; pits of amber colored one appreciably smaller in the mouth, but they were not measured. The only common characteristic of the two was the astringent quality of the fruit. Correspondence with the places where it was said to have been seen, has been most unsatisfactory in results. I do not know where it can be found. Some improvements cut out the plantation while the beautiful fruit hung on the branches.

From specimens of fruit and flowers sent to the Botanical Garden at Cambridge, Mass., Prof. Watson suggests that it should be called var. *leucocarpa*. H. L. T. WOLCOTT.

Reviews of Foreign Literature.

General Index to the First Twenty Volumes of the Journal (*Botany*), *and the botanical portion of the Proceedings, Nov.*, 1838, *to June*, 1886, *of the Linnæan Society*. By B. Daydon Jackson, Secretary. (8vo, pp. viii+428. London, 1888.)

In the preparation of this index a great labor has been accomplished for the Linnæan Society by its industrious Secretary, and all those who have occasion to use the Journal will be grateful to him for the saving of time this useful volume will accomplish. As an index it is as complete as could be desired. Every species, genus and order mentioned is referred to, the contributors and their papers are given in detail, and a geographical classification of the papers is also included. Synonyms are printed in italics and names of new species indicated by an asterisk. When we realize that the compilation of this index was not authorized until June, 1886, and that it has been several months in printing, while the editor has meanwhile been continuously occupied with the new Index to Plant Names, the amount of work he has accomplished is surprising, and we congratulate him and the society on its completion. E. G. B.

Ein Beitrag zur Kentniss der Structur und des Wachsthums Vegetabilischer Zellhäute. Von G. Krabbe. (Pringsheim's Jahrbuch, Vol. 18, No. 3.)

In the first part of this article the author treats mainly of the spiral striping of the bast fibres and tries to decide the question, whether in the same layer several systems of stripes cross each other, as Naegeli says, or if each layer possesses only one set of stripes, as claimed by Dippel, Strasburger, and others. He agrees fully with the latter opinion, claiming that this is seen to be true very clearly by focusing on different cross-sections.

In the second part he takes up the manner in which the cell wall thickens. He seems to reach no more than a strong probability, however, that intussusception has nothing to do with growth in thickness. He says that the hypothesis that the wall grows in thickness by the deposition of successive new layers is the only one which makes the stripings of the layers intelligible. The appearance of the wall at the first stages of its growth indicated this; that which appeared to be the first new layer lacking a complete union with the primary wall, or, as the author expresses it, this was seen by the looseness with which the new layer was connected with the old wall. He holds it also probable that each layer is made up of a number of thin layers which unite together before being deposited on the wall. It is supposed by some that this appearance is caused by processes which take place after the wall is completed, but the author finds in the bast fibers of the Asclepiadaceæ and Apocynaceæ indications which fully justify the former theory. A singular fact concerning these fibers has often been described, viz.: that the radial diameter of the single fiber varies in different places along its length. This is explained by a widening of the cell at some places and the wall undergoing thickenings in certain other places, so that the lumen is extremely small. Now at these widened places a process was watched which appears to verify this notion of the component layers forming and afterward uniting together and then finally attaching themselves as a single layer to the wall growing in thickness. The protoplasm at the end of these widened places differentiated into extremely fine lamellæ in the form of caps, also at the sides the same process took place; these lamellæ afterward were seen to unite into a homogenous layer. Thus he believes to have seen the building of the separate thin lamellæ and their subsequent union into a single one.

The widening-out process has its interest in that it furnishes very strong probable evidence that growth in surface is the result of intussusception. In the first place it is noticed that the walls are but very little thinner here than at other places of the cell, the surface meantime has doubled its original size. Now if this were due to extension alone, the elasticity of the wall must equal 100 per cent., which has not been proven by any experiments on the nature of the cell wall. Also to have caused so great an extension, an enormous pressure must be assumed, and this is difficult to account for. The author therefore takes the ground that intussusception must have taken place in producing this growth. He admits, however, that this cannot be considered conclusive proof of this process, but that it furnishes a strong probability to the many already deduced from similar facts.

The system of stripes in each layer, he holds, consists of spiral bands attached to each other, but originating as a differentation of a layer previously homogeneous, and not, as Dippel and Strasburger claim, by a local thickening of the membrane. Besides this, he claims to have discovered lamellæ running in the opposite direction; these, however, disappear with age, and are supposed to be due to different substances in the cellulose of the membrane.

At the close the author makes some general deductions from the facts given, which have already been called in question. (See Botanische Zeitung, June 8, 1888.) He says there is another process in the formation of cell membrane quite independent of apposition or intussusception, and names this a new-building. It is doubtful whether this differs from the process generally understood by the term apposition. The author, it appears, limits this term to the application of continuous, ready-formed layers to the snrfaces of the old walls, while the building of these layers is held to be something entirely disconnected, and therefore requiring a different name. It is objected to this that as long as we know nothing about the manner of molecular building it is useless to add another term, and that until we know more definitely about the separate process, the one term, apposition, is sufficient for both.

The critic adds, however, that this article is a welcome addition to our store of facts in reference to the much discussed question of the manner of cell growth. E. L. G.

On the Origin and Behavior of Nitric Acid in Plants. B. Frank. (Ber. d. d. Bot. Ges., v., 472-487.)

The author, in the first place, discusses the theory prevailing in vegetable physiology, according to which the nitrates taken up by the plant from the soil are conducted upwards into the leaves, where they are utilized in the formation of organic nitrogen compounds, which, in their turn, migrate back to the points at which they are consumed. The facility with which the osmosis of the nitrates takes place, and the actual occurrence of saltpetre, seemed to justify this opinion. From the fact that nitric acid is mostly found in the greatest proportion in roots and stems, diminishing toward the leaves, in which it is either not present at all or in only very small quantities, and from its total absence from the parenchyma of the leaves, it has been concluded that its assimilation must take place in the green cells of the leaf. The absence of nitric acid from the branches of shrubs and trees some have sought to explain by assuming that these plants do not meet with any nitrates, but only with ammonium compounds, in the deeper layers of the soil to which their roots penetrate.

On the other hand, Liebig's opinion that the ammonia of the soil is the only source of nitrogen available to the plant for assimilation has, of late, found new advocates. Berthelot and André* determined the relative amounts of nitric acid in the soil and in plants grown on it, and found, *e. g.*, in *Amarantus giganteus*, 320 kg. of saltpetre per hectar, while the soil itself could not have furnished more than 54 kg., in which calculation, however, the investigators did not consider the stony subsoil. Still they assume that in the tissues of the stem a nitrification of the ammonia, or even an oxidation of free nitrogen, is taking place.

The author then proceeds to give the results of his own investigations. The best reagent for nitric acid was found to be diphenylamin—sulphuric acid—which is the only one producing a distinct blue coloration. All the seeds examined, of plants belonging to many different orders, contained absolutely no nitrates, nor did their seedlings show any trace of it if the seeds were caused to germinate in water free from saltpetre. Plants were grown both in water containing no nitrogen compounds at all, and in nutrient liquids with ammonium salts, instead of nitrates, dissolved in them. All the experiments proved conclusively that no plants, not even the true "saltpetre plants" (sunflower, tobacco, *Urtica*, *Amarantus*, etc.), will ever contain any nitrate, unless their roots have been in a position to receive it, and that no plant has the power to form within itself even a trace of nitric acid, either in the light or in the dark.

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*Compt. rend., XCVIII., No. 25. and XCIX., Nos. 8-17.

As to the distribution of the nitric acid in plants, the result is reached that in typical, so-called saltpetre plants, much more nitric acid is received during the period of vegetation than is needed at the time being for the production of new organs. The excess of the unchanged nitrate is stored in all those organs which are available for this purpose, and as cells with large spaces for cell-sap are especially well adapted to keep the nitrates in solution, the parenchyma tissues of root, bark and pith, petioles, and veins of leaves will serve for the temporary storage of the nitrates, so that at the time when the fruit is ripening the suddenly increased demand for nitrogenous substance can quickly be supplied. Even in plants which thus far were supposed to contain no nitric acid (trees, yellow lupine, etc.), it is always found in their roots, not, however, higher upwards, most likely because it is soon assimilated into nitrogen compounds.

The principal argument in favor of the theory that the assimilation of the nitric acid must take place in the green leaf, in connection with the formation of the organic carbon compounds, is, as mentioned above, the observation that in many plants the nitric acid can be demonstrated in the tissues as far as the veins of the leaf, and then disappears. After referring to the fact that in arboreous, and in a few other plants, no nitric acid at all is found in the leaves, the author describes several experiments in order to prove that there is no migration of the nitrates whatever, having the leaf for its terminus, and finally reaches the conclusion that the nitric acid which is taken from the soil as nitrogenous food is not assimilated in the green leaf-tissue, but in any one of the different organs in which it has been stored for future use; or, with many plants, in the roots, soon after its absorption from the soil. J. S.

Hand-book of the Amaryllideæ, including the Alstrœmeriæ and Agaveæ. By J. G. Baker, F.R.S., F.L.S. 8vo., pp. 216. London. George Bell & Sons, 1888. Price five shillings.

We have been accustomed for many years to see occasional descriptions of new species and monographs of genera of this most beautiful order of plants from the pen of Mr. Baker. These he has now brought together in the form of a compact hand-book, suitable alike for botanists and florists, much on the plan of his recent "Hand-book of the Fern Allies." The three tribes, Amarylleæ, Alstromerieæ and Agaveæ, are treated in detail; the other two are omitted, having recently been carefully monographed in the Journal of the Linnæan Society and the Journal of Botany. Sixty-one genera and about six hundred and seventy species are described. The genera are just equally divided between the Eastern and Western Continents, thirty in each, with *Crinum* cosmopolitan. The United States genera are *Zephyranthes*, with four species, *Z. aurea*, S. Wats., becoming *Z. longifolia*, Hemsley; *Crinum*, with one, *C. Americanum*, L.; *Hymenocallis*, with *H. Caymanensis*, Herb. (Curtiss, N. A. Plants, No. 2830; Wright, Plantæ Cubanæ, No. 3245), *H. crassifolia*, Herb., *H. Galvastonensis* (Herb.), Baker (Texas, Drummond, 370, 412; E. Hall, 630), *H. Palmeri* and *H. humilis*, S. Wats., and *H. lacera*, Salisb., and *Agave*, with twelve species. Each genus is preceded by an analytical key, rendering it easy to reach any species. The book is printed in clear type, on good paper, and neatly bound. It should be found in every working botanists' library, as its low price puts it within the reach of all. N. L. B.

On the Presence of Sexual Organs in Æcidium. By George Massee. (Annals of Botany, ii., 47-51; one plate.)

Mr. Massee announces a discovery which, if found constant in the species, is entirely unexpected and will set mycologists a new line of research. It appears that the *Uromyces Poae*, Rab., believed to be a stage in the life history of the cluster cups found on *Ranunculus Ficaria*, is very rare in Britain, while the *Æcidium* is everywhere abundant. This led to the idea that it might have modes of reproduction independent of the *Uromyces*. Careful search among many sections finally revealed the tip of a branch of mycelium ending in a clavate head. Further sections through portions of the leaves first discolored by the fungas showed this body to be an oögonium and accompanied by an antheridium, by the contents of which it appeared to be fertilized. Subsequently it develops into the *Æcidium*. N. L. B.

Index to Recent American Botanical Literature.

Arauja (*Schubertia*) *graveolens*. (Gard. Chron., iv., 271; fig. 33.)

Artificially Fertilized Flowers.—A Protection for.—E. S. Goff. (Garden and Forest, i., 339; illustrated.)

Asa Gray and Darwinism.—Lester F. Ward. (Reprinted from The Historical American, for Aug., 1888; illustrated with portrait of Dr. Gray.) A pleasing resumé of the position that Dr. Gray occupied in the controversy over the principles of organic evolution.

Asa Gray.—Memorial of. (Pamph., 8vo., pp. 45.)

An account of the proceedings of the Adjourned Annual Meeting of the American Academy of Arts and Sciences, held in Boston, Wednesday, June 13th, 1888, to commemorate the life and services of the great botanist. The addresses of Prof. Joseph Lovering, Augustus Lowell, Prof. Eliot, Prof. G. L. Goodale, Prof. W. G. Farlow and Sereno Watson are printed in full.

Asterina, Dimerosporium and Meliola.—Synopsis of the North American Species of.—George Martin. (Reprinted from Journ. Mycol.)

Buzzards Bay.—July on the Shores of.—M. G. Van Rensselaer. (Garden and Forest, i., 327.) A popular account of the most conspicuous plants of the region.

Desmids—North Carolina.—A Preliminary List of.—W. L. Poteat. (Journ. Elisha Mitchell Sci. Soc., v., 1-4.) Eighty-one species are enumerated.

Entomophthoreæ of the United States.—The.—C. E. Bessey. (Am. Nat., xxii., 643-645.) A review and synopsis of the work of Mr. Roland Thaxter, as published in the Mem. Bost.